ABSTRACT

The present invention provides a compact tablet storage and take-out apparatus capable of quickly discharging and filing tablets. The tablet storage and take-out apparatus includes: a cylindrical drum; drum driving means; a plurality of tablet cassette mounting bases (341) which are fitted to an outer surface of the drum; tablet cassettes which are detachably mounted on the tablet cassette mounting bases; and a guide passage which guides inside the drum tablets discharged from the tablet cassettes. Moreover, the apparatus includes: a transfer robot which is provided inside the drum so as to be liftable and also rotatable, and which transfers the vial held by arms between a delivery position located outside an opening formed in an upper end or a lower end of the drum and a tablet filling position where the tablets discharged through the guide passage are filled. The position of at least one of the drum and the transfer robot is controlled so that an opening of the vial held by the transfer robot agrees with an outlet of the guide passage.

FIG.6

1.   Operation display panel

2.   Vial supply part

         Rotation driving device

         Bottle detection sensor

         Position detection sensor

3.   Labeling part

4.   Tablet supply part (Drum)

5.   Cassette identification sensor

         Tablet detection sensor

         Rotation driving device

6.   Tablet supply part (motor base)

7.   Bottle detection sensor

         Inversion driving device

         Rotation driving device

         Discharge driving device

8.   Cap supply part

9.   Parallel moving device

         Push-up driving device

         Rotation driving device

         Position detection sensor

         Cover detection sensor

10.   Capping part

11.   Bottle detection sensor

12.   Storage part

13. Host computer

14. PC (Device control application)

15. Device controller

16. Photographing part

17. Digital camera

18. First transfer robot

19. Position detection sensor

    Elevation driving device

    Parallel moving device

    Arm driving device

20. Second transfer robot

21. Elevation driving device

    Arm driving device

    Oscillation driving device

    Extension-Contraction driving device

    Rotational driving device

    Position detection sensor

    Bottle detection sensor

22. Third transfer robot

23. Fourth transfer robot

FIG.24

1. Second robot arm

2. Start

3. Move to delivery position

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Vial detected?

Extend arm boom

Located at holding position?

Stop extension of arm boom

Hold vial

Contract arm boom

Located at origin

Take-out coordinates received?

Lifting and rotational movement

Arm base at tilt position

Take-out coordinates reached?

Extend arm boom

Take-out position reached?

Standby for filling period

4.   Remaining tablets dropping operation

5.   Oscillating operation

6.   Tablets tend to remain?

7.   Filled amount 65% or more?

8.   Arm base at horizontal position

        Move to delivery position

        Delivered?

FIG.25

1.   Mutual control

2.   Start

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Take-out coordinates received

Detect current drum coordinates

Detect current arm rotational coordinates of second transfer robot

Determine rotation directions within rotation limits

Estimate coordinates of intersection of drum coordinates and arm

rotational coordinates

Rotate drum

Rotate second transfer robot

Coordinates of intersection reached?

Stop both rotations

FIG.26

1.   Drum control

2.   Take-out coordinates reached?

Stop drum rotation

FIG.27

1.   Robot arm control

2.   Stop rotation of second transfer robot

FIG.32

1.   Double drum

2.   To flow of any one of

Robot arm control

Drum control

Mutual control

3. Outer drum?

Detect current coordinates of outer drum

Detect current coordinates of inner drum

Determine rotation directions within rotation limits

Estimate intersection coordinates of outer drum and inner drum

Rotate outer and inner drums

Intersection coordinates reached?

Stop outer and inner drums

FIG.33

1. Auxiliary transfer robot

2. Outer drum take-out coordinates received.

Standby at delivery position

Vial arrived?

Extend arm boom

Hold viral

Contract arm boom and swivel

Elevating base

FIG.36

1. Third robot arm

2. Start

Move to first delivery position

Vial empty?

Vial detected?

Hold vial

Move to second delivery position

Transmit photographing permission signal

Photographing completion signal received?

Move to third delivery position

Delivery to capping part

Release arm

Standby at current position

Cap fitting completion signal?

Hold vial

Move to fourth delivery position

Delivered?

FIG.37

1.   Photographing initialization

2.   Start

     Main body turned ON?

     Turn On PC

     Activate device control application

     Transmit initialization signal

     Obtain initial origin of each device

     Turn ON camera

     Make initial zoom setting

3.   Select image size

Define image quality

Set flash

Color balance

Receive initialization completion signal

FIG.38

1.   Photographing control

2.   Start

     Photographing permission signal received?

     Auto-focus detection

     Focus control

     Photographing signal

     Access photographing image file

     Transfer and temporality save data

     Monitor display

     Manual check ON?

3.   Clear temporary data

4.   Image saving permission operated?

     Transmit photographing end signal

FIG.39

1.   Photographing part 400

2.   Device controller 802

3.   At initial process

4.   Activate vial application

5.   Transmit initialization data

6.   Initialize camera

7.   Turned power ON or designate initialization

8.   Initialize each device and wait for packing data

9.   At packing process

10.   Transmit packing designation

11.   Designate photographing with camera

12.   Save image

13.   Transmit photographing completion

14.   Photographing with camera

15.   Transmit camera image

16.   Packing processing

17.   Photographing position

18.   To the next process

19.   At ending processing

20.   End vial application

21.   Camera closing processing

22.   Turn power OFF

FIG.40

1.   Photo display upon packing completion

2.   COMPLETE screen

3.   Notify packing completion

4.   Notification of pickup

5.   Pickup confirmation screen

6.   Enlarged photo screen

7.   Designate photo enlargement

8.   Complete packing

9.   Bottle to dispensing window

10.   Blink corresponding 7SEG

11.   Confirm pickup operation

12.   Read prescription bar code

13.   Pickup bottle

14.   Confirm prescription details

15.   Photo display after packing completion confirmation

16.   PHOTO list screen

17.   Photo screen

18.   PHOTO list screen

        Designate prescription

19.   Read in bar code of dispensed bottle label.

FIG.42

1.   Pyrazolone tablets with external tablet supply part

2.   Start

        Prescription data received.

        External tablet supply part designated?

        Tablet cassette detected?

        Discharge tablets

        Select vial size

        Create print data

Transmit data

Transfer vial by first transfer robot

Printing and labeling by labeling part

Transfer vial by first transfer robot

Transfer vial by third transfer robot

Transfer vial by fourth transfer robot

Vial taken out?

Tablets filled?

Photographing to be omitted?

Clear stored data

Confirm details with naked eyes

Take out cap from external cap storage part and perform plugging

3.   Normal control

4.   Photographing button?

Standby vial to be returned?

Third transfer robot/fourth transfer robot empty?

Interrupt processing

Transfer by third transfer robot/fourth transfer robot

Moved to photographing position?

Photographing completed?

Transfer by third transfer robot

Transfer by fourth transfer robot

Vial taken out?

FIG.43   0.0 Main menu